* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]The information which has relation mutually especially about an optical disc and an optical disk unit uses this invention for the optical disk unit which plays the optical disc and this which were recorded on two or more tracks, and is preferred for it.
[0002]
[Description of the Prior Art]Conventionally, in the optical disk unit, the method of reading the recorded information currently recorded on the track is used by [by which it was formed in the information storage side] making many laser beams condense on 1 - three tracks among the tracks of a book. And in the optical disk unit, various tracking error detecting methods on condition of this read method are established. For example, they are the 3 beam method, the push pull method, the DPD (Differential Phase Detection) method, etc.
[0003]
[Problem(s) to be Solved by the Invention]By the way, in order to raise the amount of recorded information which can be read at once by one laser beam more than now, it is considered to be also one solution to read recorded information from four or more tracks at once, but. There is nothing that such an optical disk unit is not put in practical use now, therefore was established also as detection system of the tracking error.
[0004]This invention was made in consideration of the above point, and though it is simple composition, it tends to propose the optical disc and optical disk unit which can read recorded information from many tracks simultaneously more than before.
[0005]
[Means for Solving the Problem]In [in order to solve this technical problem] an optical disc of this invention, A track bunch which becomes by two or more tracks (TR_{k1} - TR_{k4}) is formed in parallel spiral shape, and a track interval (d2) between track bunches is formed more widely

than a track interval (d1) in a track bunch.

[0006]In an optical disc of this invention, a track bunch which becomes by two or more tracks (TR_{k1} - TR_{k4}) is formed in parallel spiral shape, And an optical pickup part (1) which a track interval (d2) between track bunches irradiates with a predetermined region of an optical disc (5) currently formed more widely than a track interval (d1) in a track bunch, and carries out image formation of the catoptric light on a photo detector (6), It has a signal processing part which generates a tracking error signal based on presenting power of an output signal outputted, respectively from two or more light-receiving cells (RF1-RF4, T1, T2) located in a line on a photo detector (6).

[0007]

[Function]The track bunch which becomes by two or more tracks (TR_{k1} - TR_{k4}) is formed in parallel spiral shape, And even if it does not use a special optical system by forming more widely than the track interval (d1) in a track bunch the track interval (d2) between track bunches, a tracking error can be detected, and recorded information can be simultaneously read from two or more tracks.

[0008]

[Example]About a drawing, one example of this invention is explained in full detail below.

[0009](1) The track bunch (henceforth a band) to which the optical disc of the example of ********** made four tracks one unit shall be formed in parallel spiral shape. The track arrangement is shown in drawing 1. Drawing 1 carries out image formation of the information storage side of an optical disc on an acceptance surface. Incidentally the shade on a drawing expresses the existence of PITSUTO, and the place where a bright place does not have PITSUTO, and the dark place express the place with PITSUTO.

[0010]However, in the case of this optical disc, as shown in drawing 1, it is considered as the thing which has the track interval d2 larger (namely, d2>d1) than the track interval d1 in a band between bands and which records a track like. The optical disk unit explained after the following paragraph is made as [detect / a tracking error] using the difference in this track interval.

[0011](2) the whole composition (2-1) **** of an optical pickup -- this paragraph explains the entire configuration of the optical pickup 1 using drawing 2. The optical pickup 1 consists of two or more optical elements besides the light emitting diode 2 with a predetermined luminous region. It is condensed with the object lens 4 and the optical beam ejected from the light emitting diode 2 irradiates with the optical disc 5 top, after penetrating the half mirror 3. An optical beam irradiates with the predetermined region over two or more tracks formed on the optical disc 5 at this time.

[0012]After being condensed via the object lens 4, it is reflected by the half mirror 3 and image formation of the catoptric light reflected in the surface of an optical disc is carried out on the

acceptance surface of the photodetector 6. The light-receiving cell is arranged so that it may correspond to the image formation pattern of drawing 1 in the acceptance surface of this photodetector 6, namely, so that the track pitch of the optical disc 5 may be suited. Incidentally the field of a light-receiving cell is given in the field which multiplied the luminous region of the light emitting diode 2 by orthogonal magnification n_1 of the lens package. These light-receiving cell is arranged at the interval according to the size and track pitch of PITSUTO by which image formation is carried out on the photodetector 6. For example, the image of PITSUTO condensed on the photodetector 6 is because it becomes the size which multiplied the size of PITSUTO of an optical disc by magnification-of-objective n_2. A light-receiving cell shall be arranged by same PITSUCHI d1 as the track pitch by which image formation was carried out to the acceptance surface.

[0013]Now, signal processing of the photodetection signal detected by these light-receiving cell is individually supplied and carried out to the tracking error detecting circuit unit 7. That is, the tracking error detecting circuit unit 7 is outputted from an output terminal through signal processing of the inputted photodetection signal being added from addition or ******** with dignity as it is for every track. From the 1st output terminal, the information signal (RF signal) read from the optical disc 5 is outputted, a tracking error signal is outputted from the 2nd output terminal, and a focus error signal is outputted from the 3rd output terminal here. In the following paragraph, the detailed internal structure of this tracking error detecting circuit unit 7 is explained.

[0014](2-2) The composition of the composition tracking error detecting circuit unit 7 of the tracking error detecting circuit unit is shown in drawing 3. The light-receiving cells RF1-RF4 are objects for RF detection which use the shade pattern of each track for detecting as an RF signal here. The light-receiving cells T1 and T2 arranged to the both ends are the objects for detection of a tracking error. The tracking error detecting circuit unit 7 is made as [amplify / it / input into RF amplifier 7A the RF signal outputted from the light-receiving cells RF1-RF4, and]. After getting over by the digital signal processing circuit 7B, respectively, the RF signal amplified with RF amplifier 7A is supplied to the output controller 7C, and is memorized by the memory 7D.

[0015]The digital information signal outputted from the output controller 7C is supplied to the digital disposal circuit 7E, and a digital to analog is carried out, and it is outputted as analog information signals (an audio signal, a video signal, etc.) from an output terminal after that. The output from the light-receiving cell T1, T2, and the light-receiving cells RF1-RF4 is incorporated into the digital disposal circuit 7F, and a TORATSUKIGU error is detected based on the detection principles explained in the following paragraph. This detection result is incorporated into the servo circuit 7G as a tracking error signal, and is outputted as a tracking error signal and a focus error signal.

[0016](3) Explain the detection principles of the tracking error by the digital disposal circuit 7F to the tracking error detection-principles last. The digital disposal circuit 7F can detect a gap of tracking based on the light-receiving cells RF1-RF4, and T1 and six RF signals inputted from T2. Next, when there are the output level and gap by which tracking is outputted from each light-receiving cell in the ********** case, distribution of the output level outputted from each light-receiving cell is shown.

[0017]Drawing 4 (A) is the intensity distribution of each [tracking / of a ********** case] light-receiving cell first. In this state, the output level of the light-receiving cells T1 and T2 provided in detection of the tracking error becomes equal. Signs that tracking shifts from this state are drawing 4 (B) - drawing 4 (G).

[0018]Among these, since the state of drawing 4 (B), drawing 4 (D), and drawing 4 (E) differs in the intensity distribution of the output level outputted from the light-receiving cells T1 and T2, it can detect a tracking error. On the other hand, the state of drawing 4 (C), drawing 4 (F), and drawing 4 (G) has an equal output level of the light-receiving cells T1 and T2, although tracking has shifted. However, intermediary **** whose intensity is stronger than others and RF light-receiving cell since only light-receiving cell RF4 is located on the gap between bands also in this case as shown, for example in the state of drawing 4 (C). Intermediary **** with the same said of the case of drawing 4 (F) and drawing 4 (G), and certainly high intensity of one light-receiving cell.

[0019]Thus, when tracking has shifted, a strong high light-receiving cell is obtained only on the gap between bands. Therefore, when the output level of the light-receiving cells T1 and T2 is equal, the direction and quantity from which tracking has shifted can be detected by detecting an intermediary **** light-receiving cell with the strongest intensity among the light-receiving cells RF1-RF4 for RF signal detection.

[0020]The optical disk unit which can read recorded information from four tracks simultaneously by this is realizable. Since a special optical system is not needed for detection of this tracking error, a miniaturization and low-pricing of an optical pickup are realizable.

[0021](4) In other examples, in addition above-mentioned examples, although the case where recorded information was simultaneously read from four tracks was described, this invention can be applied, not only this but when reading recorded information from two or more tracks. Also in this case, what is necessary is just to make it take the large interval of the track between bands from the interval of the track in a band, when using as one band two or more tracks read simultaneously.

[0022]

[Effect of the Invention]As mentioned above, by this invention, the track bunch which becomes by two or more tracks is formed in parallel spiral shape, and the track interval between track bunches is formed more widely than the track interval in a track bunch.

Therefore, even if it does not use a special optical system, the optical disc which can read recorded information from two or more tracks simultaneously can be obtained easily.
The optical disk unit which does not need to use an optical system special to reading recorded information from two or more tracks simultaneously can be obtained.

[Translation done.]